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GROWTH OF THE NASAL BRIDGE IN CHILDREN

By LOUIS R. SULLIVAN

THE material used in this investigation was collected by Professor Boas in 1890 in connection with a series of measurements on school children of Worcester, Mass. The other measurements have been treated elsewhere.[1] The following report is in the nature of a laboratory exercise in a course on "Growth" at Columbia University under Professor Franz Boas who planned and supervised the work.

The shape of the nasal arch was recorded by means of a stout lead wire bent across the bridge of the nose from the inner canthus of one eye to that of the other. The cross-section thus obtained was then transferred to paper by tracing. In measuring a specially prepared transparent instrument marked off in millimeter squares was used. The transverse diameter of the cross-section of the bridge of the nose was measured at points 2, 4, 6, and 8 millimeters from the apex. The average for each year, the variability, and number of cases are recorded in Table 1.

TABLE I

TRANSVERSE DIAMETER OF NASAL BRIDGE AT POINTS 2, 4, 6, AND 8 MM. FROM APEX

(Measurements in mm. a = average for each year. σ = variability. n = number of cases)

Boys

Age in Years	2 mm. from Apex			4 mm. from Apex			6 mm. from Apex			8 mm. from Apex		
	a	σ	n	a	σ	n	a	σ	n	a	σ	n
5	7.6	± .60	5	11.3	± .40	5	15.2	± .80	5	19.8	± .60	4
6	6.8	±1.03	30	10.1	±1.26	30	13.4	±1.91	30	16.8	±2.47	26
7	7.0	±1.01	51	10.1	±1.43	51	13.2	±1.96	51	16.1	±2.76	43
8	7.0	±1.21	45	10.3	±1.53	45	13.2	±2.15	45	16.3	±2.72	42
9	7.0	±1.45	55	10.1	±1.98	55	13.4	±2.66	55	16.5	±3.28	44
10	7.0	±1.00	49	10.2	±1.20	49	13.3	±1.82	49	16.5	±2.19	47
11[2]	—	—	—	—	—	—	—	—	—	—	—	—
12	7.2	±1.13	50	10.1	±1.70	50	13.0	±2.62	50	15.7	±3.61	44
13	6.9	±1.08	46	10.0	±1.52	46	12.7	±2.13	46	15.9	±2.83	44
14	6.8	±1.08	29	9.7	±1.65	29	12.1	±2.55	29	14.3	±3.21	28
15	6.5	±1.13	25	9.5	±1.23	25	12.2	±1.83	25	14.7	±2.59	25
16	6.7	± .97	10	8.9	±1.27	10	10.8	±1.47	10	12.6	±1.60	10

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[1] Boas, Franz, and Wissler, Clark, "Statistics of Growth," *Report of the Commissioner of Education for 1904.*

[2] 11 year old boys missing.

Girls

5..........	7.3	± .87	12	11.4	±1.29	12	15.3	±1.64	12	17.5	±1.11	4
6..........	7.2	± .90	20	11.0	±1.40	20	14.9	±2.23	20	16.8	±1.77	8
7..........	6.7	± .88	33	9.9	±1.34	33	13.0	±1.80	33	15.4	±2.40	19
8..........	6.7	±1.02	34	9.9	±1.37	34	12.9	±1.79	34	15.2	±2.21	21
9..........	6.7	± .82	34	10.0	±1.41	34	13.1	±2.12	34	15.5	±2.48	26
10..........	6.9	±1.01	35	10.4	±1.37	35	14.0	±2.14	35	15.2	±2.63	10
11..........	6.7	±1.02	40	10.1	±1.42	40	13.5	±2.61	40	15.9	±2.21	25
12..........	6.6	±1.06	46	9.5	±1.31	46	12.3	±1.94	46	14.3	±1.74	38
13..........	7.1	±1.22	31	10.2	±1.75	31	13.2	±2.18	31	15.9	±2.85	28
14..........	7.1	±1.15	37	10.0	±1.64	37	12.4	±1.80	37	14.8	±2.46	31
15..........	6.7	±1.25	16	9.4	±1.73	16	12.0	±2.37	16	13.5	±2.25	12
16..........	7.1	± .86	5	9.7	± .75	5	11.9	± .58	5	13.5	± .89	5

Inspection of this table shows a gradual decrease of the transverse diameters with increasing age. The irregularity of the decrease is undoubtedly due to the small number of cases recorded and to the inaccuracies inherent in the method adopted.

In order to obtain a clearer picture of the character of growth, we have assumed the transverse diameters to decrease proportionally to time, so that the diameter w_t at the age t may be expressed by the formula

$$w_t = a + bt.$$

This reduction gives the following results:

TABLE II

THEORETICAL VALUES FOR TRANSVERSAL DIAMETERS OF NASAL BRIDGE AT POINTS 2, 4, 6, AND 8 MM. FROM APEX

Girls					Boys				
Age	2 mm.	4 mm.	6 mm.	8 mm.	Age	2 mm.	4 mm.	6 mm.	8 mm.
5........	6.9	10.6	14.2	16.8	5.........	7.1	10.5	13.6	17.1
6........	6.9	10.5	14.0	16.5	6.........	7.1	10.4	13.5	16.9
7........	6.9	10.4	13.8	16.2	7.........	7.0	10.3	13.4	16.7
8........	6.9	10.3	13.6	16.0	8.........	7.0	10.2	13.3	16.5
9........	6.9	10.2	13.4	15.7	9.........	7.0	10.2	13.2	16.3
10........	6.9	10.1	13.2	15.4	10.........	7.0	10.1	13.1	16.1
11........	6.9	10.0	13.0	15.2	11.........	7.0	10.0	13.0	15.9
12........	6.9	9.9	12.8	14.9	12.........	7.0	10.0	12.9	15.7
13........	6.9	9.8	12.7	14.6	13.........	7.0	9.9	12.8	15.5
14........	6.9	9.7	12.5	14.3	14.........	7.0	9.8	12.7	15.3
15........	6.9	9.7	12.3	14.1	15.........	7.0	9.8	12.6	15.1
16........	6.9	9.6	12.1	13.8	16.........	7.0	9.7	12.5	14.9
Decrease...	0	1.0	2.1	3.0	Decrease...	0.1	0.8	1.1	2.2

From Table II we see that there is a gradual decrease in the diameter from year to year. We can only interpret this smaller diameter to mean forward growth of the nose. At birth, in all races, the transverse diameter of the bridge is much greater than the antero-posterior diameter. As growth continues in the Caucasian groups these diameters tend to become equal. The greatest amount of growth is in a forward (antero-posterior) direction. The distance between the canthi of the eyes is probably fixed at a very early age. On account of the absence of definite landmarks, the amount of lateral growth has been disregarded.

The minimum amount of this forward growth may be shown in the following way. Assuming the maximum diameter to be constant, the distance from this diameter to the apex of the bridge will increase and thus the antero-posterior growth may be determined. Assuming the diameter of 13.5 mm. as constant, the following amounts of forward growth are found:

	Boys	Girls
5 years	5.9 mm.	5.6 mm.
6 "	6.0 "	5.7 "
7 "	6.1 "	5.8 "
8 "	6.1 "	5.9 "
9 "	6.2 "	6.0 "
10 "	6.3 "	6.3 "
11 "	6.3 "	6.4 "
12 "	6.4 "	6.6 "
13 "	6.5 "	6.8 "
14 "	6.6 "	7.1 "
15 "	6.7 "	7.3 "
16 "	6.8 "	7.6 "
Forward growth	.9 "	2.0 "

We also notice that in the given time there is a greater decrease in diameters or a greater forward growth among the girls than among the boys. Assuming the form of nose to be the same for both sexes at an early age and a narrow high nose to be a form belonging to older individuals, it may be inferred that the girls for a given age are older physiologically than boys of the same age. Examining the measurements for each year we find that:

5-year-old girls	correspond best with the	6-year-old boys
6 " " "	" " " "	9 " " "
7 " " "	" " " "	12 " " "
8 " " "	" " " "	12 " " "
9 " " "	" " " "	12 " " "
10 " " "	" " " "	12 " " "
11 " " "	" " " "	10 " " "
12 " " "	" " " "	14 " " "
13 " " "	" " " "	12 " " "
14 " " "	" " " "	14 " " "
15 " " "	" " " "	14 " " "
16 " " "	" " " "	14 " " "

In almost every case the girls correspond to much older boys, but the fourteen, fifteen, and sixteen-year-old girls all correspond to the fourteen-year-old boys. We take this to mean that the girls are practically physiologically mature at fourteen while the boys continue to grow after this age. It is not meant to infer that these numerical data are final, but it is of interest that they agree with what has been found in other cases of growth.

These data suggest that a racial study of the nose should be based on accurate studies of its development during the period of growth. A comparison with the nose of anthropoid apes can be conducted successfully only by the same method. In a thorough study of this problem the form of the entire nose should receive consideration and casts should be substituted for the inaccurate lead wire cross sections. The number of cases should be greatly increased and since the annual growth is so slight the age unit could be increased from 1 to 4 years. A full appreciation of racial differences in anatomical structures must be preceded by a knowledge of the process of growth.

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